

## **Implementation of Science Curriculum in Nigerian Tertiary Education: Problems and Way Forward**

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**Abstract:** The paper examined the problems facing the implementation of science curriculum in the Nigerian tertiary institutions. Secondary data were used to support the points raised in the article. The secondary data were sourced from printed materials and online publications by recognized institutions and individual authors. The paper concludes that inadequate funds, shortage of science lecturers, lack of infrastructure facilities, corruption, strike actions, brain-drain and ineffective capacity building programme, insecurity challenges and poor supervision are problems facing the implementation of science curriculum in the Nigerian tertiary institutions. Based on this problems identified, the paper recommended adequate funding of tertiary institutions in Nigeria as means of ensuring effective science curriculum implementation in the institutions across the country.

**Keywords:** Science curriculum, Curriculum implementation, Tertiary institution.

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### **Introduction**

Tertiary institution plays a vital role not only in shaping the future by educating the professionals of tomorrow, but also creating a research based for sustainability efforts and providing outreach and service to communities and nations. Historically, higher education has served the twin purpose of research and teaching. In its knowledge production function, higher education institutions have been the centers of innovation and creators of new knowledge in diverse fields of human activity. The knowledge production function is based on academic rigor and the intellectual apparatus within the higher education institutions. Over decades, such an intellectual apparatus has contributed to the establishment of orthodoxy around the meaning and epistemology of knowledge. This orthodoxy has been associated with the privileging of intellectual activity within higher education institutions over any such activity in society itself. As a result, it has been assumed that knowledge production is taking place only in higher education institutions; people's experiences and daily struggles in communities produce experiences, not knowledge. Tertiary institutions delivery her objectives through curriculum developed for each programme (Isife & Ogakwu, (2016).

Tertiary institution is host to many curriculum such as art, social science, education and science curriculum. Recently, the National Universities Commission approved Core Curriculum and Minimum Academic Standards (CCMAS) for official implementation in all the Nigerian universities. The (CCMAS) provides 70 percent of what should be taught along with the expected outcome, while the university will provide 30 percent based on their individual contextual peculiarities and characteristics. The CCMAS has 17 disciplines and 238 academic programmes which will replace the BMAS used in Nigerian universities. The Core Curriculum and Minimum Academic Standards (CCMAS) offered in the Nigerian tertiary institutions covers

science curriculum such as Agriculture, Forestry, Engineering and Technology; Environmental Sciences, Pharmaceutical Sciences, Medicine and Dentistry; Science Veterinary Medicine etc. Science curriculum is one of the current that is taught in the Nigerian tertiary institutions (Ogunode, Ohibime & Jegede, 2023). Science curriculum is defined as curriculum that are practical inclined. Science curriculum is also viewed as curriculum that are designed for science related programme. Science curriculum is the curriculum that is very important to the social, economic and technological development of a nation. The implementation of Science curriculum in the Nigerian tertiary institutions have been plagued with many problems. This paper is aimed to discuss the problems that has militated against effective implementation of science curriculum in the tertiary institutions in Nigeria.

### **Curriculum Implementation**

Curriculum implementation is the act of carrying out planned learning experiences in the educational institutions. Ogunode, Akin-Ibidiran, & Ibidiran (2021) view curriculum implementation as the process of curriculum execution in the educational environment. Onyeachu (2008) defines curriculum implementation as the process of putting all that have been planned as a curriculum document into practice in the classroom through the combined efforts of teachers, learners, school administrators, parents as well as interaction with physical facilities, instructional materials, psychological and social environments. Curriculum implementation according to Okebukola (2004) is the transition of the objectives of the curriculum from paper to practice while Obanya (2004) sees implementation of curriculum as day-to-day activities which school management and classroom teachers undertake in the pursuit of the objective of any given curriculum. Curriculum implementation is the translation of theory into practice, or proposal into action (Ivowi, 2004). Okoro, (2010) asserts that Curriculum implementation makes teachers to prepare lesson notes, use reinforcement and motivational strategies, classroom control and creation of friendly relationship, application of theories and principles of learning, effective use of evaluation techniques and adequate consideration of learner's cognitive styles. This facilitates resolution of instructional challenges as well as achievement of overall goals of education, which is the vision of the 21st century. Jamoh & Aminu, (2021) submit that putting the curriculum into operation requires an implementation agent. The teacher is identified as the agent in the curriculum implementation process. Curriculum implementation is the systematic arrangement that leads to execution of planned curriculum. Isife, & Ogakwu, (2016) view curriculum implementation as the execution of the curriculum document. Curriculum implementation is putting into action the planned curriculum. This shows that it is the actual classroom teaching that the learners are expected to put in practice for the society to benefit from them.

### **Problems Facing Implementation of Science Curriculum in Nigerian Tertiary Education**

There are many problems facing science curriculum implementation in the Nigerian tertiary institutions; some of which includes: inadequate funding, shortage of science lecturers, lack of infrastructure facilities, corruption, strike actions, brain-drain and ineffective capacity building programme and insecurity challenges.

#### **Inadequate Funding**

Funding is an integral factor in curriculum implementation especially in science programmes. More funds are needed to procure the resources required to fully implement the curriculum. Poor funding have been identified as a major problem in curriculum implementation in the Nigerian higher institutions (Okoro, 2010). Ohibime & Mohammed, (2022) point out that poor funding of education in Nigeria have affected curriculum implementation in the schools. Ogunode, & Aiyedun, (2020) note that inadequate funding is one of the major problem facing the administration of science programme in the Nigerian higher institutions. Annual budgetary allocation for the administration and management of science programme is not adequate. The administration of science programme is very cost intensive. So, more funds are needed to effectively implement science programme in higher institutions across the country. Ogunode & Onyekachi (2021) identify the factors responsible for inadequate funding of public universities in

Nigeria to include lack of political will, corruption, increase in population, inflation, fall in national revenue and poor financial planning.

### **Shortage of Science Academic**

Shortage of science academic in some tertiary institutions across the country have affected effective implementation of science curriculum. Okwelogu, Ndayebom, & Ogunode, (2023) define science Academics as professional lecturers with specialization in the field of sciences. Science Academics are science teachers that specialized in programmes like Biology, Chemistry, Physics, Mathematics, Environmental science, Biochemistry, Biotechnology, Zoology, Botany, Agricultural science, Geology, Physic, Statistics, Computer science and so on. A science academic is an individual that has been trained and certified by various tertiary institutions to practice in the field of sciences. Okwelogu, Ogunode & Abayomi, (2021) confirm that science lecturers are vital to the development of science education. Science lecturers are implementers of science curricula in higher institutions. The place of science teachers in the development of science education cannot be underestimated. An effective science teacher should be a master of his subject, as well as grounded in methods of teaching and be able to relate the science concepts to real-life experience. Ogunode, & Aiyedun, (2020) opine that another problem facing the administration of science programme in the Nigerian higher institutions is the challenge of inadequate science lecturers. It is unfortunate that many tertiary institutions do not have adequate science lecturers to execute the science curriculum. NEEDS (2014) observe that shortage of qualified teachers in Nigerian universities. The understaffing of universities in Nigeria has serious implications for quality instruction and academic productivity in the institutions. The situation has led to an increasing culture of visiting lecturership in the system. The few available qualified lecturers are recycled as visiting, adjunct, sabbatical and contract lecturers to work in many universities at the same time. Many of them are always on the road travelling from one university to another and unable to meet their primary obligations with their tenure-employer (Federal Ministry of Education, 2012). In the tertiary level, the subsector of colleges of education experiences a very acute teaching staff shortage in disciplines such as special education and early childhood development, while the polytechnic subsector reported a very acute shortage of teaching staff in health technology (NEED, 2014). Data from the NUC revealed that universities experience an acute shortage of teaching staff in computer science and technology-based disciplines, but teaching staff shortage is very acute in disciplines such as law, engineering, medicine and surgery. These shortages are attributed to several reasons, such as poor incentives for serving teachers, inadequate turnout of teachers in these subjects by teacher-training institutions in the country, and the exodus of lecturers to Western countries in search of greener pastures (NEEDS, 2014). Ogunode & Adamu (2021) and Ogunode & Okwelogu (2022) point out that underfunding, poor manpower planning, poor motivation, government policy on the embargo, corruption (Ghost worker) and strike action problems are the causes of inadequate academic staff in the public universities in North-central Nigeria.

### **Shortage of Infrastructure Facilities**

The curriculum implementation of science programme have also be disrupted by shortage of infrastructure facilities. Ogunode (2020) defines Infrastructure facilities as those facilities aiding delivery of academic and non-academic services in educational institutions. Infrastructural facilities include; libraries, laboratories, halls, offices, administrative blocks, hostels, roads facilities, water, electricity, internet etc. The availability of the infrastructural facilities in adequate quantities will support effective administration of educational institutions and the inadequacies will prevent effective administration of educational institutions. It is unfortunate that majorities of tertiary institutions in Nigeria are faced with the problem of shortage of facilities. In the area of modern laboratories, Okwelogu, Ndayebom & Ogunode, (2023) assert that science academics in Nigerian public universities are faced with the problems of lack of modern laboratories to conduct research and implement teaching programmes. Most public universities spread across the countries do not have modern laboratories where advanced

research can be carried out. This has put stress on many science academics working in various public universities. Though some newly established universities have modern laboratories while many others don't. Ezechi, & Ogbu, (2017) submit that majority of Nigerian schools lack laboratory spaces, and those who have spaces lack the equipment and necessary infrastructure for proper teaching and learning of science. Science, therefore, is not a miracle where something happens out of nothing. Ebehikhalu & Dawam (2017) point out that most of the laboratories are dilapidated and relevant equipment is lacking and where they are available, inadequate equipment makes them non-functional and obsolete. Sometimes, the laboratories double as lecture rooms which are not conducive for teachings and learnings. In the words of Ebehikhalu, the provision of ventilation is very poor with inadequate lighting, overcrowded and stuffy. At the main campus, there was only one central, inadequately equipped engineering workshop for eight programmes. In the area of offices and lecture hall, Okwelogu *et al.*, conclude that majorities of science academics in universities across the country do not have conducive offices where they can relax and even carry out some minor research work. This problem is linked to the challenges of the facilities gap in most public universities. It has been observe that public universities are faced with shortage of infrastructure facilities. This made it impossible for most of the universities to provide decent and conducive offices for their academic and non-academic staff. Ogunode, (2020) and Ogunode & Jegede, (2021) state that factors responsible for inadequate infrastructural facilities in Nigerian public universities include; underfunding, increased student population, corruption, poor infrastructural facilities planning, poor supervision and inflation.

### **Corruption**

Corruption in the administration and management of tertiary institutions in Nigeria have affected the science curriculum implementation. Corruption is an act of dishonest or fraudulent conduct by those in power, typically involving bribery, kickback, bid-rigging, illegal lobbying, influence-peddling, product or fund diversion etc. Funds meant for the capital and recurrent services in the tertiary institutions are been diverted by some administrators. Funds budgeted for different programmes in the implementation of science programme are being diverted into private banks. Funds meant for the development of infrastructure facilities are diverted and mismanaged. The limited funds provided for the internal management also are being diverted and this has affected curriculum implementation in different tertiary institutions in the Country. Godwin (2017) and Ahmodu & Sofoluwe, (2018) confirm that University administrators have been accused of financial scandals. From Vice-chancellors to Bursars, various officials of major Nigerian universities have been accused of corruption with some of them already being prosecuted. For example, Saharareporters (2017) submitted that the former Vice Chancellor of the Federal University of Petroleum Resources (FUPRE) in Effurun, Delta State, was arrested alongside other top management staff of the institution over N300 million fraud scandal of National Economic Empowerment and Development Strategy (NEEDS) assessment fund granted to the institution. Rather than use the fund to finance building projects, it was diverted to other thing. Ogunode, Josiah & Ajape, (2021) and Ogunode, Ohunene & Olatunde-Aiyedun, (2022) agree that the following are the reasons for high financial corruption in the public universities in Nigeria: corrupt school administrators, lecturers and students,; weak monitoring and evaluation system,; weak trade unions,; political interference,; weak educational system; and poor accountability system.

### **Strike Actions**

A strike is a stoppage of work as a result of mass refusal of employees to work in reaction to employees grievances (Research clue.com, 2021). Adavbiele, (2015) states that strike actions are increasingly gaining recognition in the educational sector of this country; and this phenomenon has attracted the attention of well-meaning Nigerians and stakeholders. The term 'strike' has been described in different forms. The possibility of a strike is the ultimate economic force a union brings to bargaining table. Strike action in the Nigerian tertiary institutions have affected smooth science curriculum implementation. Okwelogu, Ndayebom, & Ogunode, (2023) observe

that strike action by different union groups in the public universities in Nigeria is a very enormous challenge facing the science academics in public universities. Ogunode, Jegede, Adah, Audu, & Ajape, (2020); Ogunode & Abubakar, (2020) opine that another challenge facing Nigerian higher institutions is the problem of an unstable academic calendar. The various unions and groups within the schools also contribute to the unstable academic calendar. They often embarked on strike action because of disagreement with the government on welfare issues. The strike actions always disrupt the academic programmes of the institutions, causing more cost and prolonging student academic programmes. Ogunode, Ugochukwu, & Jegede, (2022) note that strike actions in the tertiary institutions of learning have constituted a serious threat to effective learning. During strike action in the universities, all teaching, research and academic activities are suspended. This makes it impossible for science academics to teach, carry out practicals within the schools and even perform community services to the communities. Strike actions in the tertiary institutions have disrupted science curriculum implementation.

### **Brain-drain**

The thesaurus of the Education Resources Information Center-ERIC, (2020) defines brain-drain as the “Loss of highly skilled or educated persons from one country, region, institution, or job sector to another, based on better pay, improved living conditions, expanded opportunities, between others”. Brain-drain challenge in most of the higher institutions have also hampered the implementation of science curriculum in the Nigerian tertiary institutions. Ogunode, & Aiyedun, (2020) submit that Brain-drain is one of the major factor responsible for ineffective administration of science programme in many Nigerian higher institutions. Many academic staff that are supposed to be lecturing and mentoring the students here in Nigeria are leaving every day to abroad for a better job. Smah, (2007) submits that Professor Joseph Stiglitz, the 2001 Nobel Prize winner in Economics, who, while delivering a lecture at the first Dr. Pius Okadigbo memorial lecture series in Enugu said that there is a particular university in the U.S. that has over 25 Nigerian professors. He submitted that the above pointer is instructive for any serious-minded government that wants to address the issue of brain-drain. Odetunde, (2004) submits that, there was mass exodus of many brilliant lecturers to the business world and others left Nigeria for better services. Oni, (2000) observes that many experienced and young lecturers are fleeing from the frustration of university life into more rewarding and more challenging sectors of the economy and even migrate to overseas countries. The result of the faculty exodus is observed in the quality of graduates that our universities produce. There is diminishing scope of mentoring junior researchers by seasoned and senior lecturers in Nigeria due to brain drain. Brain drain has led to decline in research outputs from institutions of higher learning in Nigeria vis-à-vis the disappearance of research centers in Nigerian universities.

### **Ineffective Capacity Building Programme**

Training and retraining programme is very important for implementation of curriculum especially the science curriculum that requires expertise and professionalism. The importance of a professional development program for academic and non-academic staffs cannot be overstated. Professional development program helps academic and non-academic staffs to increase their knowledge and skills. Kulkarni (2013) state that training and development programs are germane to improved employees' performance at work, updating their knowledge, improving their skills and confidence level. It is unfortunate that many science academic are not constantly being trained. Okwelogu, et al., (2023) state that ineffective training programme is a problem science academics are faced with. Staff training, conference attendance and facilities development are handled by TETFund. TETFund is an institution established by the Nigerian government to sponsor staff development and conference attendance for Academic and Non-academic staff. Many science academics have applied for TETFund to further their studies both at Master's and PhD levels but are denied due to inadequate funds on the part of the commission. Ogunode & Oluseun, (2020) concludes that inadequate funding of Nigerian higher educational institutions is a major problem facing the administration of professional development program for employees

across higher institutions in Nigeria. Adequate funding is vital for the implementation of the professional development program. Without adequate funding, no professional development program can be fully implemented as planned. Many programs of the for higher education institutions, such as the teaching program, research program and community service program have not been adequately developed due to poor funding. The professional capacity development program for higher education institutions is not effectively implemented in many higher education institutions across the country due to poor funding of higher education in Nigeria.

### **Insecurity**

Insecurity is a major problem that has affected science programme curriculum implementation in the Nigerian tertiary institutions recently. Several institutions of learning have been attacked leading to the death of many students, lecturers and researchers. Insecurity, according to Ubong (2016), refers to whenever people have a feeling of self-doubt or vulnerability and susceptibility to injury or harm or even threat of a corporate body such as the threat the nation of Israel is made to feel by Iran and other neighboring countries. In simpler words, insecurity is an emerging or existing threat to one's comfort, physical, psychological, emotional well-being and related others. Ogunode & Ukozor (2022); and Ogunode & Abubakar, (2020) observe that the insecurity challenges facing the country are preventing effective administration and management of higher institutions in Nigeria. The insurgents in the Northern part of Nigeria have attacked many higher institutions disrupting their academic programme, killing students and destroying infrastructural facilities meant for teaching and learning. According to reports published by Owonikoko, (2022) about 800 secondary school and university students have been kidnapped in coordinated attacks by terrorists and bandits. Akin- Ohiare, Ogunode & Sarafadeen, (2021) and Ibidira, Ogunode, & Ibidiran (2022) note that the insecurity problem in Nigeria is also affecting curriculum implementation. Due to insecurity, many higher institutions in the country no longer enjoy a stable academic calendar. Insecurity has collapsed the school calendar in Nigerian educational institutions. Ogunode, (2020) affirms that insecurity is another problem facing the administration of public universities in Nigeria. Nigeria is facing an insecurity challenge and this is affecting the entire educational institutions in the country. The Islamic sect called Boko Haram, meaning western education is forbidden is attacking educational institutions in the Northern part of Nigeria. Many public universities located in Northern Nigeria have been victims of continuous attacks. Many students, lecturers and administrators have been killed while others kidnapped. The various attacks on the universities have resulted in school closure leading to the unstable academic programme (Ogunode, 2020).

### **Poor Supervision**

Poor supervision of science curriculum in the tertiary institutions has affected the implementation. Akin-Ibidiran, Ogunode & Ibidiran, (2022) assert that poor supervision of tertiary institutions by the various institutions and individuals in charge is also among the factors contributing to poor implementation of the curriculum in Nigerian tertiary institutions. Edokhamhen & Ogunode, (2020) note that ineffective supervision is also responsible for poor teaching methods in higher institutions in Nigeria. The Nigerian government, in a bid to ensure effective supervision of teaching programmes in the higher institutions, established the following agencies: universities are supervised by the National Universities Commissions, while colleges of education are supervised by the National Commission for Colleges of Education (NCCE). The National Board for Technical Education (NBTE) oversees polytechnic education. These commissions are responsible for policy decisions affecting institutions under their supervision, maintenance of standards through a system of periodic accreditation of courses, distribution and monitoring of government funding, the appointment of members of governing councils, and the day-to-day running of the institutions (NEEDS, 2014). These supervisory agencies of higher institutions have not been effective in the supervision of teaching programmes at the various higher institutions due to many challenges that include underfunding, shortage of staff, weak leadership and internal problems. The inability of these supervisory agencies to effectively

supervise the activities of the higher institutions is one of the factors responsible for poor teaching in the higher institutions in Nigeria (Edokhamhen & Ogunode, 2020; Ogunode & Ndayebom, 2022). Ogunode & Adanna, 2022) identified inadequate funding, shortage of personnel, inadequate transportation facilities, insecurity, opposition from labour unions, limited offices, strike actions, inadequate supervision materials and corruption as factors responsible for poor supervision of higher institutions in Nigeria.

### **Conclusion and Recommendations**

Science curriculum are offered in most tertiary institutions in Nigeria. The objective of science curriculum is to ensure advancement in the development of science and technology in Nigeria through properly teaching, research and community service. The objectives of the science curriculum is best achieved through effective science curriculum implementation in the institutions.

The paper discussed the problems facing the implementation of science curriculum in the Nigerian tertiary institutions. The paper concluded that inadequate funds, shortage of science lecturers, lack of infrastructure facilities, corruption, strike actions, brain-drain and ineffective capacity building programme, insecurity challenges and poor supervision are problems facing the implementation of science curriculum in the Nigerian tertiary institutions. Based on this problems, the paper hereby recommended the followings:-

1. the government should increase the funding of tertiary institutions in Nigeria.;
2. more science academic should be employed in all the tertiary institutions in Nigeria. This will aid in the implementation of the science curriculum.;
3. the government should provide more infrastructural facilities in all the tertiary institutions across the country;
4. the government should deploy ICT to fight all forms of corruption in the administration of tertiary institutions through effective financial monitoring and evaluation system and the use of anti-corruption agencies in Educational Institutions;
5. the government should increase the salaries of lecturers to prevent brain-drain in the system.; the government should address all factors causing insecurity in the country; and
6. the government should implement agreement reached with different unions in the tertiary institutions to prevent strike actions.;
7. the various supervisory agencies should be strengthened to carry out their supervisory functions to ensure quality education;. and
8. the government should provide more funds for capacity building programme in the tertiary institutions to enable for more training of academics.

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